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▶ **To cite this version:**

Cyril Marchand, F. Baltzer, Elisabeth Lallier-Vergès. Organic composition and environmental conditions in mangrove sediments : a key for reconstructing the evolution of theFrench Guiana coast.. 8ème Congrès de l'ASF, 2001, Orléans, France. 2p. hal-00101552

HAL Id: hal-00101552

https://hal-insu.archives-ouvertes.fr/hal-00101552

Submitted on 27 Sep 2006

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Organic composition and environmental conditions in mangrove sediments : a key for reconstructing the evolution of theFrench Guiana coast.

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Abstract
Le littoral guyanais présente une dynamique sédimentaire remarquable résultant du système dispersif amazonien. Une mangrove, essentiellement composée d'Avicennia germinans, se développe sur les bancs de vase. Ceux-ci migrent rapidement vers le NO et limitent la durée de vie de la mangrove. Les lambeaux de forêt résiduels ont pu être datés par analyse d'images Spot successives (Véga, 2000). Les mesures des paramètres physico-chimiques, les données Rock-Eval ainsi que des observations et comptages pétrographiques ont permis d'identifier deux systèmes de fonctionnement de la mangrove : les forêts jeunes (< 9ans), caractérisées par un export tidal important, et la forêt sénescente où l'exportation tidale est limitée. La composition organique du sédiment des mangroves jeunes provient principalement des mattes microbiennes et en quantité moindre du système racinaire de la mangrove. Les mécanismes de dégradation sont des processus suboxiques résultant de l'activité du système racinaire des Avicennia. *La composition organique du sédiment de la forêt sénescente provient principalement de débris de végétaux supérieurs, les processus de dégradations sont de type anaérobie.*

The coastline of French Guiana, in spite of being a highly dynamic environment, is composed of predominantly fine-grained sediment. This is a result of the huge mud discharge of the river Amazon, partly deflected northwestward by the current of the Guianas. The resulting mudbanks accommodate a dense recruitment of mangrove propagules (predominantly *Avicennia germinans*) initiating the rapid development of mangrove forests . The sedimentary organic content of a series of six 2-m deep cores was examined in relation to the degree of the evolution of these mangrove forests, as defined by geochemical analyses and optical observations. *Avicennia*-dominated forest deposits, were collected in six stations based on stage of forest evolution. The relative forest ages have been determined using a series of Spot images (Vega, 2000).

The sedimentary organic matter in the upper sediment of the youngest mangrove swamp (Ω7 years old) is mainly derived from microbial mats with low carbon/nitrogen ratios (C/N : 6 to 8) and typical greyish amorphous organic matter as observed in optical studies. Since geochemical parameters do not give evidence of a litter made up of higher plant debris, these debris are certainly exported by tides (Boto and Bunt, 1981). A slight increase with at subsurface level of both total organic carbon (TOC) content and C/N ratio results from the development of the radial cable root-system of *Avicennia germinans*. The decay of the organic matter introduced in the soil by the microbial mats and the root system of this young forest is controlled by aerobic and/or suboxic processes, denoted by high Eh values (range : 200 to 400mV), due to the oxygen made available by mangrove roots (Sholander et al., 1955) and crab bioturbation (Clark et al., 1998).

In contrast, the organic content of the uppermost 30 cm of the senescent mangrove sediment (50 years old) is mostly derived from higher plant debris , as indicated by relatively high C/N ratios and the predominance of ligno-cellulosic debris. The strong decrease of hydrogen index values results from higher plant debris, losing hydrogen through decay processes. Moderately acidic pH values, low Eh's and the presence of framboidal pyrite point to reducing decay processes controlled by sulfate reducing bacteria.

Whatever the stage of evolution of the forest, the geochemical characteristics of the sediment below 30 cm are those of the shoreface with numerous opaque ligno-cellulosic debris deriving from the detrital discharge of the Amazon . However, the sediment collected from dead mangrove forests subsequently recolonized by pioneer mangroves contains organic markers which clearly indicate a previous phase of development of mangrove forest, therefore a previous phase of erosion and accretion. Various parameters are close to those of the senescent mangrove (low Eh, high pyrite content, high sulfur content) and highlight sulfate reducing decay. Therefore, we suggest that organic markers can be used to describe coastline evolution in this highly dynamic context.

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